2008-07-21

5011682700-LCT0

LCT216 Timer/Counter/Tachometer Instruction Sheet

Thank you very much for purchasing Love Controls LCT216 series. Please read this instruction sheet before using your LCT216 series to ensure proper operation, and please keep this instruction sheet handy for your quick reference. For more detailed information, go to www.dwyer-inst.com.

⚠ DANGER! Caution! Electric Shock!

1. When the power is on, DO NOT touch the AC terminals in case an electric shock may occur.
2. Make sure the power is disconnected when you check the unit inside.

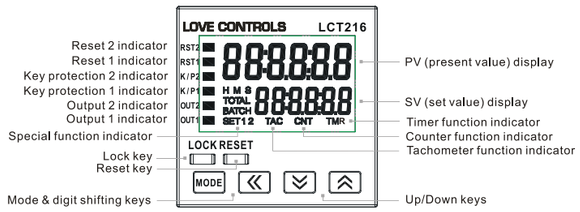
⚠ WARNING!

LCT216 is an OPEN –TYPE device. They are intended for installation completely within an overall panel and for use in counting or timing applications. If it will cause series injury to workers or damages on other equipment when used in a dangerous environment, please make sure it is installed in an automatic safety protection device.

1 Precaution

1. Always use recommended solder-less terminals: Fork terminal with isolation (M3 screw, width 7.0mm), hole (diameter 3.2mm). Screw size: M3x6.5 (with 6.8x6.8 square washer). Recommended tightening torque: 0.4 N.m (4kgf.cm). Applicable wire: solid/twisted wire of 2mm^2, 12AWG to 24 AWG. Please be sure to tighten them properly.
2. Prevent dust or metallic debris from falling into the device and cause malfunctions.
3. DO NOT modify or uninstall the device.
4. DO NOT use empty terminals.
5. Make sure the wires are correctly connected to proper terminals.
6. Keep away from high-voltage and high-frequency environment during installation in case of interference.
7. Prevent using the device in premises which contain:
   ▪ Dust or corrosive gas ▪ High humidity ▪ High radiation ▪ Vibration and shock
8. LCT216 is an open-type device. Make sure to install it in an enclosure to prevent dust, humidity in case of an electric shock.
9. Please make sure the power cables and signal device are installed correctly before switching on the power; otherwise serious damage may occur.
10. DO NOT touch the terminals or repair the device when the power is on; otherwise an electric shock may occur.
11. Please wait for one minute after the power is switched off to allow the capacitor to discharge and DO NOT touch the internal wiring within this period.
12. Use dry cloth to clean the device. DO NOT use acid or alkaline liquid to clean the device.

2 Display, Indicators & Keys



■ LCD Display & Indicators

RST 1/2	Light on when reset signal is detected	BATCH	"Batch Counting Mode" in Counter and Tachometer function
K/P 1/2	Light on when key-protected mode is enabled	SET 1 2	SV1, SV2 display
OUT 1/2	Light on when output is executing	TAC	Light on when Tachometer function is executing
H M S	Hour, minute, second, unit of timer, displayed in Timer function	CNT	Light on when Counter function is executing
TOTAL	"Total Counting Mode" in Counter and Tachometer function	TMR	Light on when Timer function is executing

■ Key Operation

▼ ▲	Increase and decrease SV or change parameter setting.
«	Left-shift 1 digit of the selected digit. The indicator of the selected digit will flash.
MODE	Save the set parameters or switch among functions.
LOCK	Prevent settings from being changed. The key-protection mode still works after the power is switched off. Press "LOCK" to enter the key-protection mode. In non-key-protection status, press "LOCK" again to enter Lock 1. In Lock 1, press "LOCK" once again to enter Lock 2. Press MODE and « together to disable the key-protection mode. LoC1 (Lock 1) disables the functions of all keys. LoC2 (Lock 2) allows the user to change SV, and the functions of "RESET" remain. "LOCK" only functions in the non-key-protection status.
RESET	Clear and reset PV.

■ Operation Mode & Configuration Mode

Operation	When the power is on, LCT216 will be in the operation mode. Press ▼ ▲ to change SV, or « to make changes on a desired digit. The indicator of the selected digit will flash. After the change is mode, press MODE to save the setting. If SV or parameters are not changed, press MODE once again to switch between SET1 and SET2.
Configuration	Press MODE in the operation mode for more than 3 seconds to enter the configuration mode. Press MODE again to switch among parameters. To return to the operation mode, press MODE for more than 3 seconds.

3 Specifications

Power input	AC 100 ~ 240V, 50/60Hz
Input voltage range	85% to 110%, rated voltage
Power consumption	Less than 10VA
External power supply	12VDC ±10%, 100mA
Display	Double-line, 6-digit negative transmissive LCD display
Input signal	Non-voltage input (NPN): ON impedance 1kΩ. ON residual voltage: 2V max.
	Voltage input (PNP): High level: 4.5 ~ 30VDC, Low level: 0 ~ 2VDC
Output 1	Relay: SPST max. 250VAC, 5A (resistance load)
	Transistor: NPN open collector. When 100mA /30VDC, residual voltage = 1.5VDC max.
Output 2	Relay: SPDT max.250VAC, 5A (resistance load)
	Transistor: NPN open collector. When 100mA /30VDC, residual voltage = 1.5VDC max.
Dielectric strength	2,000VAC 50/60 Hz for 1 minute
Vibration resistance	Without damage: 10 ~ 55Hz, Amplitude = 0.75mm, 3 axes for 2 hours
Shock resistance	Without damage: drop 4 times, 300m/s^2, 3 edges, 6 surfaces and 1 corner
Ambient temperature	0°C ~ +50°C
Storage temperature	-20°C ~ +65°C
Altitude	2,000m or less
Ambient humidity	35% ~ 85% RH (non-condensing)
Pollution degree	Degree 2

4 Parameters in Configuration Mode

■ Timer

FUnC Select a function	t nodE Set up Timer function, (counting up or down)	t otnd Select output mode of Timer	t Unit Set up the displayed unit of timer	t oUt1 Set up the pulse width of output 1	rtSr Reset min. pulse width	tnPtLC Select input type (PNP or NPN)	Back to "select a function"

■ Counter

FUnC Select a function	tntFUn Select counting modes	C tnPt Set up input mode of Counter	C otnd Set up output mode of Counter (not dual output)	dUAL Set up dual output counting mode (dual output)	C SPEd Set up counting speed	t oUt1 Set up the pulse width of output 1	

Back to "select a function"	tnPtLC Select input type (PNP or NPN)	rtSr Reset min. pulse width	PUErS Save data or not while switching off power	PSCALE Set up pre-scale value	PoCnt Set up the decimal point	t oUt2 Set up the pulse width of output 2

■ Tachometer

FUnC Select a function	tAotnd Set up output mode of Tachometer	C SPEd Set up counting speed	PoCnt Set up the decimal point	PSCALE Set up pre-scale value

Back to "select a function"	St AvG Set up the average of input data	rtSr Reset min. pulse width	tnPtLC Select input type (PNP or NPN)	St tAC Set up the delay time while switching on power

■ Timer + Counter

FUnC Select a function	t nodE Set up Timer function, (counting up or down)	t otnd Set up output mode of timer	t Unit Set up the displayed unit of timer	C tnPt Set up input mode of Counter	C otnd Set up output mode of Counter (not dual output)	C SPEd Set up counting speed	t oUt1 Set up the pulse width of output 1

t oUt2 Set up the pulse width of output 2	PoInt Set up the decimal point	PSCALE Set up pre-scale value	PUErS Save data or not while switching off power	rtSr Reset min. pulse width	tnPtLC Select input type (PNP or NPN)	Back to "select a function"	

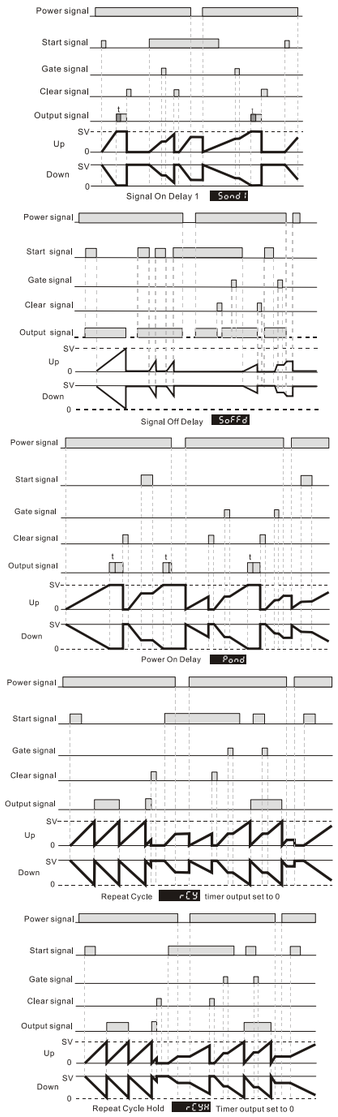
5 Timer Function

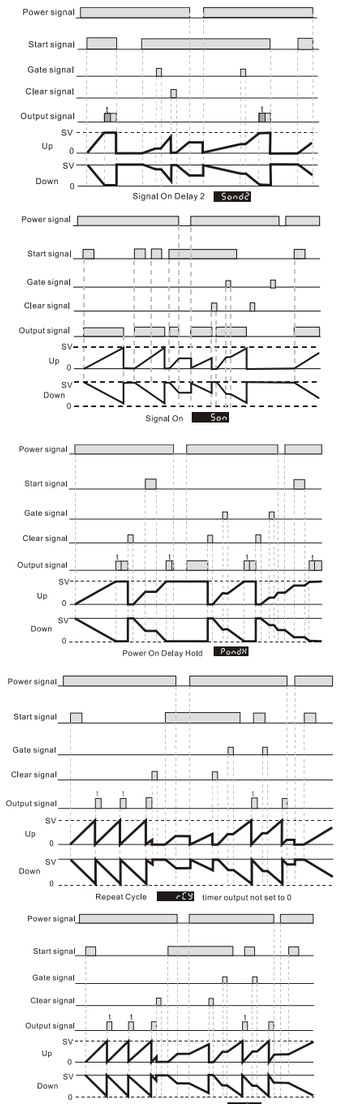
There are counting up/down modes, several counting units and output modes to choose from in the timer function.

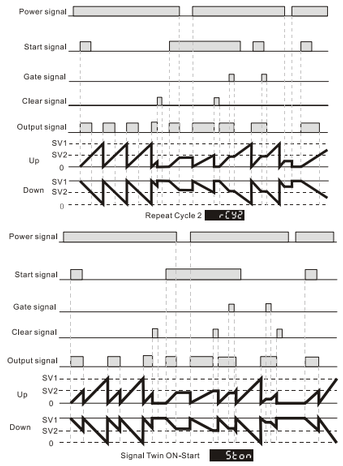
t nodE	Select counting up UP or counting down doUn
t oUt1	Set up the output time of timer, from 0 to 99.99 seconds. 0= Hold output
t otnd	Set up output modes

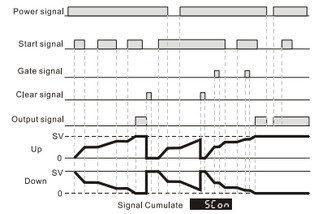
t Unit: Set up the counting unit of the timer

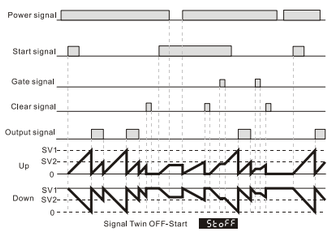
S 001	sec	0.01 ~ 9,999.99	Unit: 10 ms.	Max. counting: 9,999.99 secs.
S 01	sec	0.1 ~ 99,999.9	Unit: 0.1 sec.	Max. counting: 99,999.9 secs.
S 1	sec	1 ~ 999,999	Unit: 1 sec.	Max. counting: 999,999 secs.
nS 001	min, sec	0.01 ~ 9,959.99	Unit: 0.01 sec.	Max. counting: 5,999.99 secs.
nS 01	min, sec	0.1 ~ 9,9959.9	Unit: 0.1 sec.	Max. counting: 59,999.9 secs.
n 01	min	0.1 ~ 99,999.9	Unit: 0.1 min.	Max. counting: 99,999.9 mins.
n 1	min	1 ~ 999,999	Unit: 1 min.	Max. counting: 999,999 mins.
HnS 1	hr, min, sec	1 ~ 995,959	Unit: 1 sec.	Max. counting: 359,999 secs (100 hrs)
Hn 1	hr, min	1 ~ 999,959	Unit: 1 min.	Max. counting: 35,999,999 secs (10,000 hrs)
H 1	hr	1 ~ 999,999	Unit: 1 hr.	Max. counting: 999,999 hrs











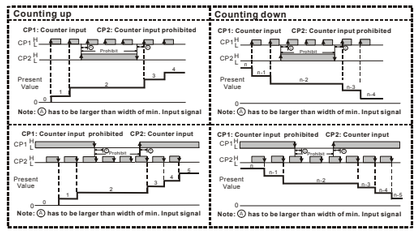
6 Counter Function

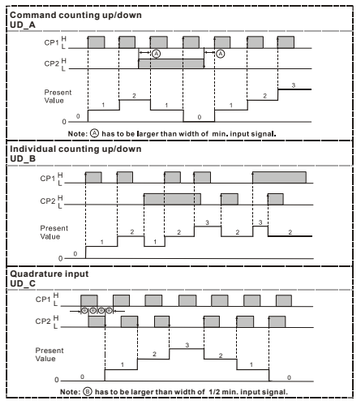
Counter functions include: 1-stage counting, 2-stage counting, batch counting, total counting and dual counting.

StAGE1	1-stage	Only 1 SV is allowed. See “Output modes of counter”.
StAGE2	2-stage	2 SVs, 2 PVs are allowed. See “Output modes of counter”.
bAtCH	Batch	Apart from the counting of PV and SV, when PV=SV, the batch counting adds 1 and clear PV as 0 for recounting till the batch counting equals batch SV.
totAL	Total	Total counting adds up all the counting values till they reach SV for output.
dUAL	Dual	CP1 and CP2 can be independent counters, but the counting speed can only reach 5kHz. CP1 and CP2 can execute addition Add or subtraction Sub.

Input modes of counter C inPt

UP	Counting up	Ud b	Individual
doUn	Counting down	Ud E	Quadrature
Ud A	Command		



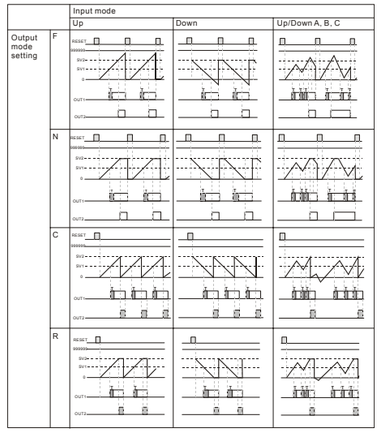


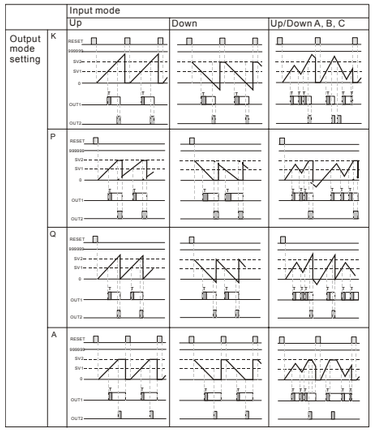
Output modes of counter C otnd:

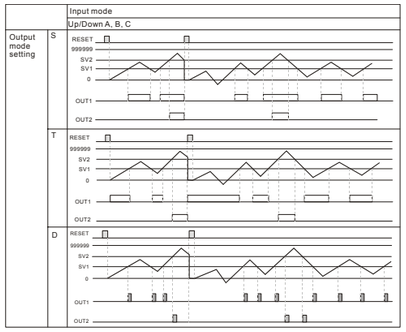
The output of SV can be 1-stage or 2-stage. When the output is set to 1-stage, Output 2 will be the same as the Output 1. The output modes include: F, N, C, R, K, P, Q, A, S, T, D

F	F	When PV reaches SV, output is enabled but counting continues. Recounting starts after reset signal is over. Output 2 remains.
n	N	When PV reaches SV, output is enabled but counting stops. Recounting starts after reset signal is over. Output 2 remains.
C	C	When PV reaches SV, recounting executes automatically. Output 2 is pulse output. Output 1 remains till Output 2 is over.
r	R	When PV reaches SV, counting stops till Output 2 (pulse) is over for recounting. Output 1 remains till Output 2 is over.
K	K	When PV reaches SV, output is enabled but counting continues. Recounting starts after reset signal is over.
P	P	When PV reaches SV, output is enabled and recounting is automatically executed. But display of counting remains till Output 2 (pulse) is over.
Q	Q	When PV reaches SV, output is enabled but the counting continues. Recounting starts after Output 2 (pulse) is over.
A	A	When PV reaches SV, output is enabled but the counting stops. Recounting starts and Output 2 (pulse) executes after reset signal is over.
S	S	When PV ≥ SV1, Output 1 is enabled. When PV ≥ SV2, Output 2 is enabled
t	T	When PV ≤ SV1, Output 1 is enabled. When PV ≥ SV2, Output 2 is enabled.
d	D	When SV=PV, output is enabled but counting continues. Addition and subtraction modes are valid.

The time of Output 1 and Output 2 (pulse) can be set up separately, ranging from 0.01 to 99.99 seconds. Recounting refers to counting up or addition/subtraction counting starting from 0 and counting down starting from SV. The counting range: -99,999 ~ 999,999. The counting will restart from 0 if the counting exceeds the range.





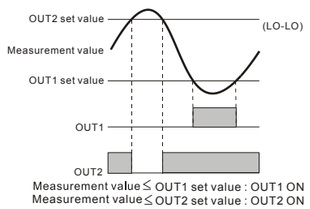


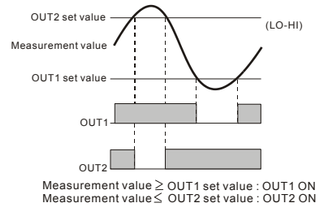
Save the data before power off PUEr5: When SAv5 is set, the current PV will be saved. When CLEAr is displayed, the PV will be cleared.

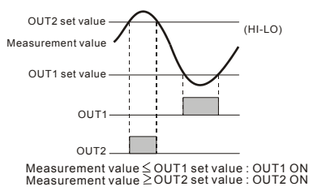
Pre-scale function PSCALE: When conducting unit conversion, PV = PV x PreScale value, ranging from 0.001 to 99.999.

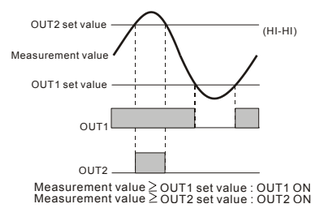
7 Tachometer Function

Measuring Rotation speed: Measuring pulse width and determining current frequency
Output methods: Lo-Lo, Lo-Hi, Hi-Lo, Hi-Hi









Delay time after switching on the power St tAC: The tachometer will start to run when the set delay time is due after the power is switched on. (Range of delay time: 0.1 ~ 99.9 seconds.)

Set up average value of input filter St AvG: Range for obtaining average (n = 0 ~ 3). This parameter obtains the average of 2^n input data for more stable output value.

8 Timer + Counter Function

In Timer + Counter function, SV1, PV1 and Output 1 are for Timer; SV2, PV2 and Output2 are for Counter. DIP switch is disabled. All timer and counter functions remain except

- RCY2, SCON, STON, STOFF in output mode of Timer function
- Command up/down, Individual up/down, quadrature counting in input mode, S, T, D in output mode of Counter function

Only 1-stage counting in Counter function is available.

9 Setting up Easy DIP Switch

The user can use DIP switch to set up parameters. When DIP is switched to ON, the corresponding parameters can only be read, not changed.

SW	Counter	Timer	Tachometer
8	Reset pulse width ON: 1ms, OFF: 20ms	Reset pulse width ON: 1ms, OFF: 20ms	Reset pulse width ON: 1ms, OFF: 20ms
7	Input type ON: PNP OFF: NPN	Unit of Timer (See Table 1)	Input type ON: PNP OFF: NPN
6	N/A	Unit of Timer (See Table 1)	N/A
5	Counting speed ON: 10k CPS OFF: 30 CPS	Unit of Timer (See Table 1)	Counting speed ON: 10kHz OFF: 30Hz
4	Output mode of counter (See Table 2)	Output mode of Timer (See Table 2)	Output mode of Tachometer (See Table 2)
3	Output mode of counter (See Table 2)	Output mode of Timer (See Table 2)	Output mode of Tachometer (See Table 2)
2	Input mode of counter ON: counting down OFF: counting up	Time counting up/down ON: down OFF: up	N/A
1	ON: Enable DIP OFF: Disable DIP	ON: Enable DIP OFF: Disable DIP	ON: Enable DIP OFF: Disable DIP

SW5	SW6	SW7	Displayed unit
OFF	OFF	OFF	0.01 sec
ON	OFF	OFF	0.1 sec
OFF	ON	OFF	1 sec
ON	ON	OFF	min, 0.01 sec
OFF	OFF	ON	min, 0.1 sec
ON	OFF	ON	0.1 min
OFF	ON	ON	Min
ON	ON	ON	hr, min, sec

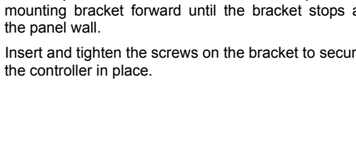
Table 1

Table 2

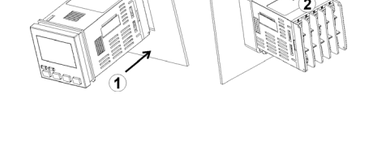
SW3	SW4	Output Mode Configuration		
		Counter	Timer	Tachometer
OFF	OFF	F	Signal ON Delay 1	Lo-Lo
ON	OFF	N	Signal ON Delay 2	Lo-Hi
OFF	ON	C	Signal OFF Delay	Hi-Lo
ON	ON	R	Signal ON	Hi-Hi

10 Terminal Definition

■ **LCT216**



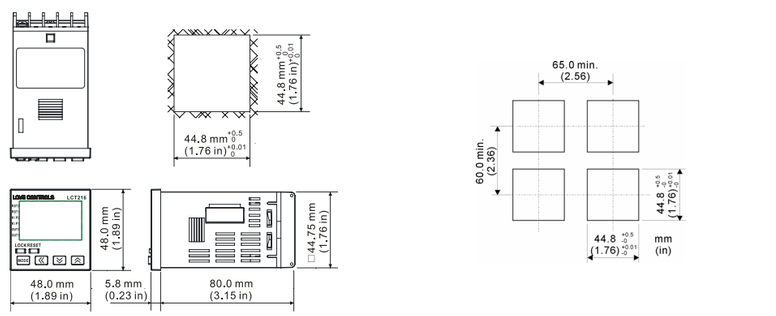
■ **Input Connections:**



■ **Multi-Function Input PIN**

Counter	Timer	Tachometer	Timer + Counter
CP1		CP1	CP1
CP2	Gate		Gate
Reset1	Reset1	Reset1	Reset1
Reset2	Start		Start

11 Dimension & Panel Cutout



12 How to Mount

1. Insert the controller through the panel cutout.
2. Insert the mounting bracket into the mounting groove at the top and bottom of the controller and push the mounting bracket forward until the bracket stops at the panel wall.
3. Insert and tighten the screws on the bracket to secure the controller in place.